

Illustrations of the Taiwanese *Catocala*, with
Descriptions of Two New Species.
Noctuidae of Taiwan 1
(Lepidoptera)

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In 1965, when I described some new taxa of the genus *Catocala* from Japan and Taiwan, I presented a brief list of *Catocala* known at that time from the island of Taiwan. The aim of the present paper is to publish a revised and enlarged catalogue with illustrations, adding several more species found since from Taiwan. Two apparently new species are also included.

Catocala is represented by eleven species in Taiwan. Except one species purely Eurasian, the majority of others are more or less associated with the warm temperate forest, sharing their distribution with southwest mainland China, especially provinces penetrated by the Changkiang River, and/or the southern district of Japan. Five species are at present not known out from Taiwan, but three of them have their close relative in the adjacent regions stated above. Finally remain two species as strictly endemic and most distinctive to the fauna of Taiwan.

The recorded localities of *Catocala* in Taiwan are almost in the montane zone of northern to central districts approximately north of 24°N. I have seen scarce specimens collected in more southerly area. Such southern limit of the genus seems

Table 1. The recorded localities of *Catocala* in Taiwan and their situation.

Prefecture	Locality	Latitude (°N)	Equivalent in Japanese
Taipei Hsien	Wulai	24.9	
Taoyuan Hsien	Tachi	24.9	
	Wenshan		
	Lalashan	24.7	Rarasan
Ilan Hsien	Taipingshan	24.5	Taiheizan
	Nanhutashan	24.4	Nankotaizan
	Lishan	24.3	Rizan
Taichung Hsien	Wushe	24.0	Musha
	Lushan (or Hotso)	24.0	Rozan
Nantou Hsien	Nanshanchi	24.0	
	Nengkaoshan	24.0	Nôkôzan
	Tayuling	24.2	
	Hohuanshan	24.2	
Hualien Hsien	Hualien	24.0	Karen(kô)
Chiayi Hsien	—	23.5±	

Where available, Roman transliteration of Chinese letters followed CHANG, C.-Y.: *National Atlas of China*, vol. 1, Taipei, 1963, not taken from label data of specimens examined. Unadopted spellings frequently used by Japanese authors are also shown in right side column.

comparable to that in Kwangtung Province of mainland China, where three species, two of which are common with Taiwan, occur as far south as 24.5°N (MELL, 1931).

Moths of *Catocala*, being great favorite with collectors, have been often supplied by native dealers in Taiwan, and such specimens sometimes bear rather rough indication of locality and no exact date of capture. This has to be taken in consideration for discussing detailed domestic distribution and period of appearance. The domestic localities treated in this paper and their situation are given in Table 1 according to the administrative division.

Following abbreviations are used to indicate the collections in which the material used in this study are placed. HK: H. KEZUKA, NSMT: National Science Museum (Nat. Hist.), Tokyo, SS: S. SUGI, TH: T. HARUTA, YK: Y. KISHIDA.

Catocala nupta (LINNAEUS), subsp.

(Fig. 1)

Phalaena nupta LINNAEUS, 1767, Syst. Nat. (Edn 12), 1: 841.

The occurrence of *nupta* in Taiwan was a very striking matter. I have seen only two specimens. One of them is in Dr. H. KEZUKA's collection obtained from native

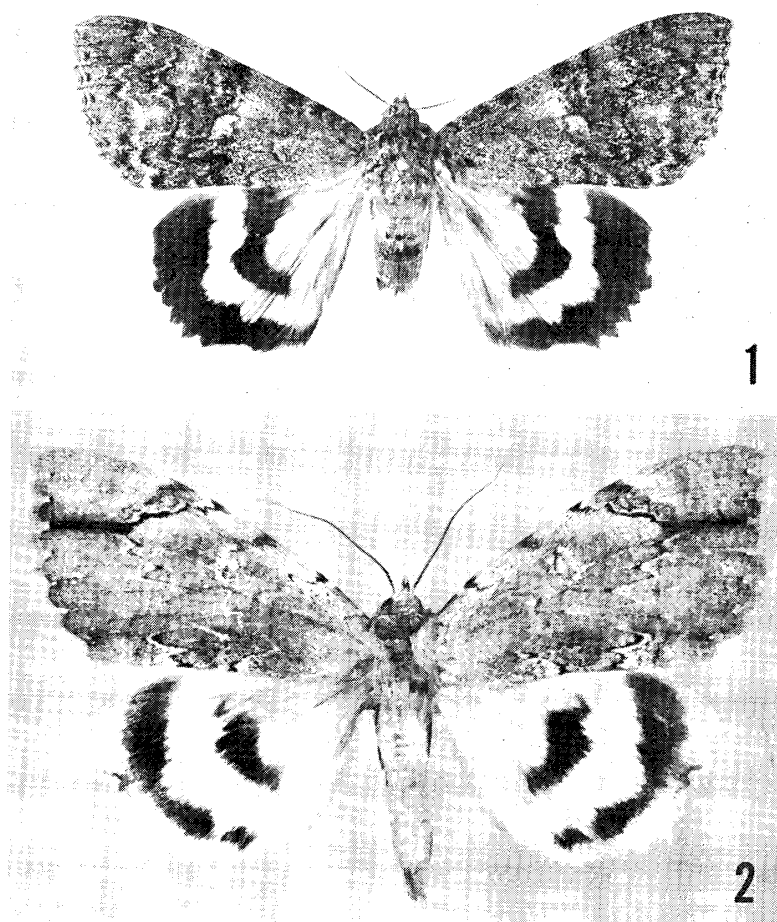


Fig. 1. *Catocala nupta* (LINNAEUS), subsp. ♂. Tayuling. Fig. 2. *Catocala nivea* BUTLER ♂. Lalashan. Figures slightly reduced for natural size.

collector and bearing a label 'Lantow hsien', possibly a misspelling of Nantou Hsien. The other (Fig. 1) was collected at Tayuling, 2500 m from sea level, as early as April 25th. This wide-ranged Eurasian moth is also common in mainland China, but southwards it is limited to high altitudes between 2500 and 4000 m in Provinces Yunnan and Sikang, where the moths were abundant and the earliest date of capture was May 5th (MELL, 1942).

I am at present unable to comment on the subspecific status of the Taiwan material, because the Chinese population of *nupta* was seriously divided into many subspecies by MELL (1936, 1942). Anyway the restoration of *nupta* in high altitude of Taiwan proposes a significant evidence of its faunal relations to the Yunnan Mounts.

Specimen examined. Hualien Hsien: Tayuling, 1 ♂, 25. IV. 1978 (S. KONDO), NSMT.

Distribution. Eurasia, eastwards to Amur, Japan, Korea, China and Taiwan.

Catocala nivea BUTLER

(Fig. 2)

Catocala nivea BUTLER, 1877, Cistula ent., 2: 241.

Catocala nivea: SUGI, 1965, Tinea, 7: 90, 93.

Two males of this beautiful Snow-underwing were recorded from the personal collection of Dr. S. ASAHINA, Tokyo (SUGI, 1965). Exact collecting data are preserved, one from Taipinshan, 1900 m, and the other from Kirettoi, at the foot of Nanhutashan, 2100 m, both in Ilan Hsien.

The Taiwan material looks hardly separable from the nominate race of Japan. It is known that in Japan the larval food-plant is strictly confined to *Prunus grayana* MAXIM. (SUGI, 1972: 6-7), showing this species never to be a general *Prunus* feeder. In mainland China it is distributed along the Changkiang River westwards, in Provinces Chekiang, Kiangsi, Hupei and Szechwan (MELL, 1936: 79).

Specimen examined. Taoyuan Hsien: Lalashan, 1 ♂, VII. 1969, ex. T. SHIMONOYA, SS.

Distribution. Kashmir, China (middle to west), Taiwan, Japan.

Catocala formosana OKANO

(Figs. 3, 4)

Catocala formosana OKANO, 1958, Rep. Gakugei Fac. Iwate Univ., 13(2): 54, pl. 1: 3, pl. 2: 12.

Catocala formosana: SUGI, 1965, Tinea, 7: 90, pl. 17: 12.

The type-series of *formosana* includes three females from Wushe, Nantou Hsien. I illustrated later a single female from Meiyuan [Baibara], Nantou Hsien, in the collection of Hokkaido University, Sapporo (SUGI, 1965). This largest, but little known species seems rather common. I have seen many specimens of both sexes most taken in Nantou Hsien, but some are labeled 'Chiayi Hsien', the prefecture being on the Tropic of Cancer. The male genitalia are here first illustrated (Fig. 11). The following specimens bear exact data label.

Specimens examined. Nantou Hsien: Near Wushe, 1 ♀, 30. VII. 1971 (Y. SHIBATA), SS. Nanshanchi, 1 ♂, 1. VIII. 1977 (Y. SHIBATA), YK.

Distribution. Taiwan.

***Catocala pataloides* MELL**

(Fig. 7)

Catocala pataloides MELL, 1931, Mitt. dt. ent. Ges., 2: 89, figs. 1a, 1b, 1c, pl. 2: 1.

Ephesia pataloides MELL, 1936, Dt. ent. Z. Iris, 50: 54, 81, fig. 26.

Pataloides was originally described upon five males from Kwangtung Province of China. MELL stated they were collected at Lungtaoshan, 750 m, N. Kwangtung, in 'subtropical montane forest', which would mean the warm temperate forest where evergreen fagaceous plants are dominant.

Occurrence of *pataloides* in Taiwan was early expected by MELL (1936: 54), who clearly stated this possibility when none of *Catocala* had been discovered from that island.

In *pataloides* the heavy anastomoses of median and marginal bands in hindwing is distinctive, forming three separate yellow spots between them. Male genitalia (Fig. 13) are here illustrated. MELL's (1936: 81, fig. 26) line-drawing of the apical part of valva sufficiently agrees with the Taiwan material.

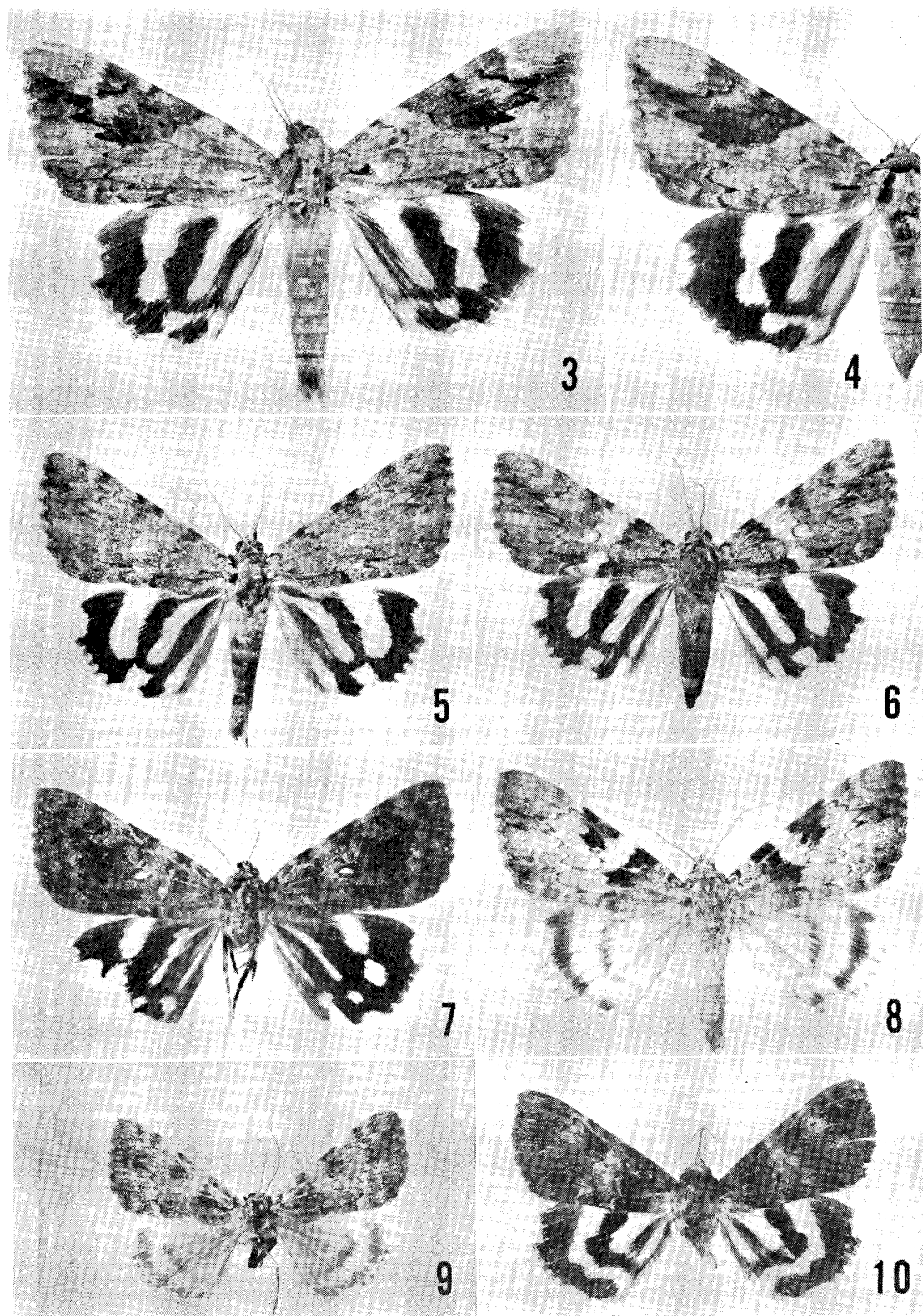
Specimens examined. Nantou Hsien: Nengkaoshan, 1 ♂, V-VI. 1969 (C. K. YU), ex A. MIYATA, SS; the same locality, 1 ♂, without date, NSMT.

Distribution. China (Kwangtung) and Taiwan.

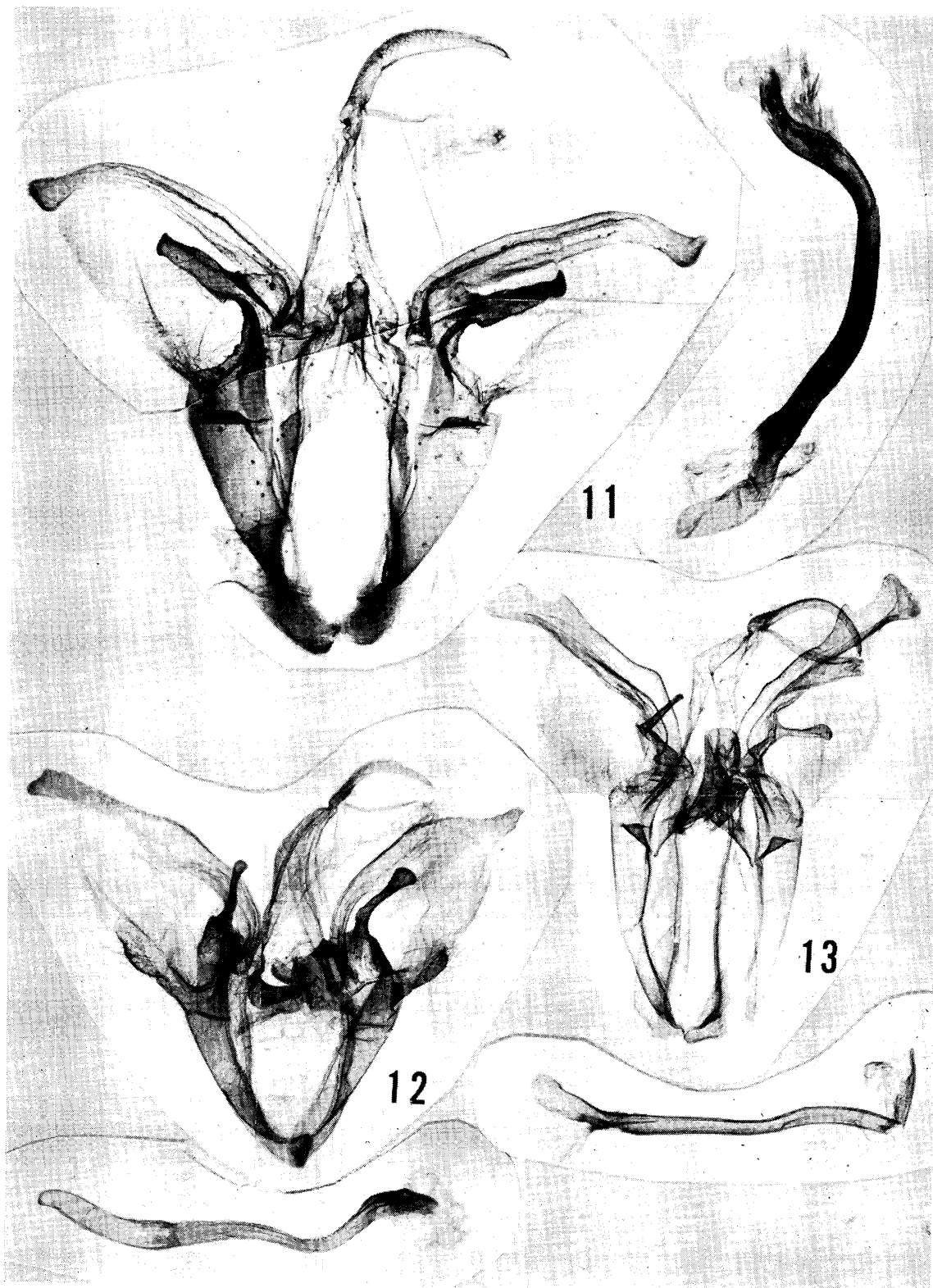
***Catocala naganoi* sp. n.**

(Figs. 5, 6)

♂. Expanse 60 mm. Hindtibia unspined. Labial palpus with second segment blackish brown at sides, whitish frontally, and third segment blackish brown mixed with white. Head and thorax dark brown mixed with brownish white, the latter suffused slightly with yellowish. Forewing somewhat bluish grey, finely irrorated with fuscous brown and entirely suffused with olivaceous hue. Subbasal line a fine black stria below costa, a fine black stria from base in submedian fold, vein 1A+2A suffused with black from base to antemedian line, which is indented outwards below costa and edged with black point posteriorly, then excurved, angulated inwards at median nervure and at 1A+2A, and in full length defined by pale shade anteriorly. A diffused blackish median shade below costa, reniform ill-defined, obscurely suffused with brownish, subreniform represented by pale diffused spot below it, with no clear definition. Postmedian line strongly serrate as in usual *Catocala*, but rather fine, especially below M_3 to submedian fold; broad red-brown suffusion beyond it, defined posteriorly by pale, diffused and serrate subterminal line; veins suffused with black in subterminal space, stronger in M_1 and M_2 . Terminal series of fine blackish points in cellules, each edged posteriorly by yellow fuscous point, which interrupts fine blackish terminal line and fuscous cilia. Hindwing bright orange yellow, median band moderate, strongly indented below CuA_2 to unite a broad fascia in submedian fold, which runs from base to termen, slightly dilated before it. Marginal band from costa to before submedian fold, its inner edge strongly curved inwards at CuA_2 to connect with the median band. A lunar yellow apical terminal spot just below apex;



Figs. 3-4. *Catocala formosana* OKANO, 3: ♂, Wushe, 4: ♀, Nanshanchi. Fig. 5. *Catocala naganoi* sp. n. ♂, holotype, Tachi/Wenshan. Fig. 6. *Catocala naganoi* sp. n., the supposed ♀, Lishan. Fig. 7. *Catocala pataloides* MELL ♂, Nengkaoshan. Fig. 8. *Catocala intacta taiwana* SUGI ♂, Lalashan. Fig. 9. *Catocala tokui* SUGI ♂, Lushan. Fig. 10. *Catocala praegnax sakaii* KISHIDA ♂, Lushan. Figures slightly reduced for natural size.



Figs. 11-13. Male genitalia. 11. *Catocala formosana* OKANO.—12. *Catocala naganoi* sp. n., holotype.—13. *Catocala pataloides* MELL.

a series of blackish points on cilia at veins M_1 to CuA_2 ; inner margin suffused with fuscous brown hair.

Underside. Uniformly bright yellow. In forewing loose, brownish antemedian suffusion below cell to vein $1A+2A$. Both edges of postmedian band nearly parallel from costa to submedian fold, inner edge of marginal band smoothly excurved. In hindwing pattern basically similar to upperside, but median and marginal bands much reduced in width, the latter not connecting with the former and extending beyond submedian fold to reach a black fascia along vein $1A+2A$.

Male genitalia (Fig. 12). Uncus relatively short and slender. Valvae asymmetrical. Left valva longer, costa well sclerotized, ending in apical lobation, which truncate apically, right valva with both costal and ventral margin abruptly incurved towards apex, which is acutely produced. Harpe moderate, its apex more dilated in right side than in left. Aedeagus strongly sinuous.

Holotype ♂. Taoyuan Hsien: Between Tachi and Wenshan, 15. VII. 1969, ex T. HARUTA, NSMT. Paratype. The same locality and date, 1 ♂, TH.

On the specimen label, the locality is stated as 'Between Tachi and Wenshan/Lalashan'. The two named places are in Taoyuan Hsien, but are far distant to specify a collecting site of specimens, I take here the former as representing exact locality of the type-series.

In my collection there is a female specimen (Fig. 6) from different source, which is presumably referable to the described males. In this female, the basic pattern is identical, but the forewing is never suffused with olivaceous hue, and rather brownish, having median white band and well-defined white subreniform. The postmedian line is clearly impressed. In hindwing the median and marginal bands are more steadily connected. Label data are as follows.

Taichung Hsien: Lishan, 1 ♀, 30. VII. 1970 (Y. MIYAKE), SS. Excluded from the type-series.

The specific name of the present new species is dedicated to Mr. Kikujiro NAGANO (1868–1919), a pioneer lepidopterist of Japan, who contributed much to taxonomy and biology at Nawa Entomological Laboratory, Gifu.

Catocala tokui SUGI

(Fig. 9)

Catocala tokui SUGI, 1976, Tinea, **10**: 53, figs. 1–7.

This species is known as the last comer to the faunal list of *Catocala* occurring in Japan. Only one Taiwan specimen is known, as stated and illustrated in the original description. The specimen is a somewhat faded female and, because of some dissimilarity to the paratype female, was excluded from the type-series. However, it may sufficiently well fall within the boundary of variations in wing pattern of the Japanese population, later clasped on longer series (8 ♂ 13 ♀) obtained in one of the paratype-locality (OWADA & NISHI, 1978). They recognized two categories in the variation of forewing pattern, the plain form to which the unique Taiwan female belongs, and the dorsally dark suffused form represented by the holotype male.

Tokui inhabits in Japan very limited areas in the south, where evergreen oak forest is well reserved in ultimate phase. A rather early flier from June to July. Early stages is unknown yet.

Specimen examined. Nantou Hsien: Lushan spa, 1 ♀, 2. VII. 1970 (Y. KISHIDA), SS.

Distribution. Japan, Taiwan.

***Catocala intacta taiwana* SUGI**

(Fig. 8)

Catocala intacta taiwana SUGI, 1965, *Tinea*, 7: 90, pl. 17: 11.

Intacta is known as resident of evergreen oak forest in hilly zone of southwest Japan, where the larva feeds on *Quercus glauca* THUNB. (SUGI, 1971, (3): 13–15) and moths fly in June to July, disappearing towards mid-summer.

The subspecies *taiwana* differs from the nominate subspecies in the reduced median and marginal bands of hindwing, otherwise nearly identical. Described from a single male in the collection of Hokkaido University, which was collected in the eastern mountain range behind the town of Hualien facing the Pacific.

In Taiwan the known localities are in northern and eastern prefectures and moths are collected in May to June. It occurs also in Chekiang Province of mainland China (MELL, 1936: 83).

Specimens examined. Taipei Hsien: Wulai, 1 ♂ 1 ♀, 22. V. 1968 (T. KIKUCHI), YK; 1 ♂, without date, YK. Taoyuan Hsien: Mt. Lalashan, 1 ♂, 15. VI. 1975, YK. Taoyuan Hsien: Between Tachi and Wenshan, 2 ♂ 2 ♀, 26–28. VI. 1979, ex T. HARUTA, NSMT.

Distribution. China, Taiwan and Japan.

***Catocala praegnax sakaii* KISHIDA**

(Fig. 10)

Catocala praegnax: SUGI, 1965, *Tinea*, 7: 90.

Catocala praegnax sakaii KISHIDA, 1981, *Tyô to Ga*, 31: 153, fig. 1.

The species *praegnax* shows longitudinally wide range of distribution as stated by MELL (1931; 1936: 84), as far north as Amur district and southwards to Kwangtung Province. It occurs throughout in Japan and in many provinces of middle part of China, westwards to Szechwan. The larva is found on leguminous shrub of *Lespedeza* and frequently on some deciduous oak, *Quercus aliena* BLUME and *Q. mongolica* FISH. in Japan (SUGI, 1971: (5): 12). Another food-plant stated by NAGANO (1916: 67; English text: 20), *Wisteria chinensis* (Leguminosae), has not been confirmed by later workers.

The Taiwan subspecies named *sakaii* seems common, as I have seen many specimens all from Nantou Hsien. The following specimens I examined bear exact data of collecting.

Specimens examined. Nantou Hsien: Wushe, 1 ♂, 15. V. 1971 (K. SAKAI), holotype of *sakaii*, NSMT; Hotso [Lushan], 4 ♂ 6 ♀, 2. VII. 1970 (Y. KISHIDA), paratypes,

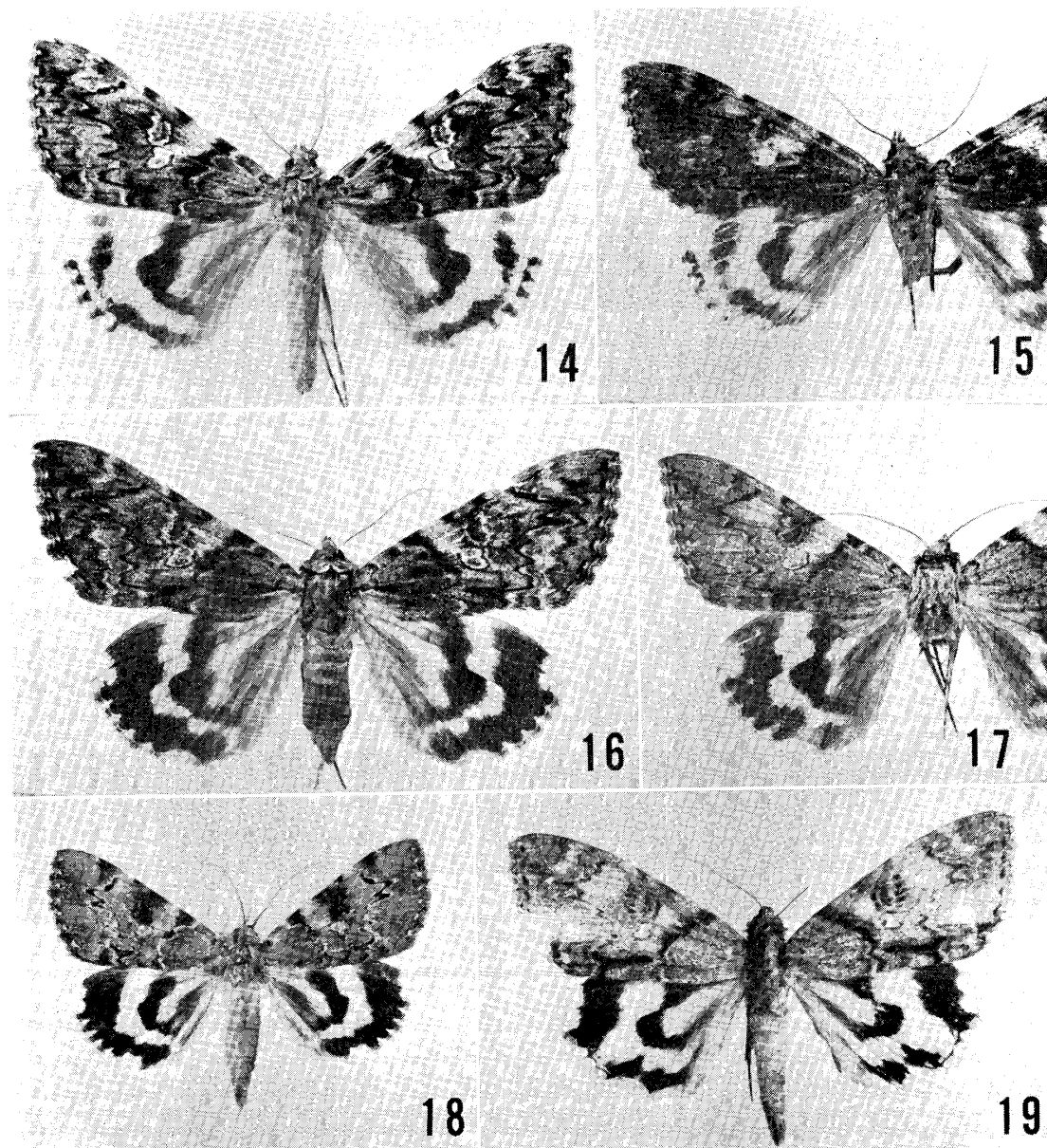
YK. 1 ♂ 2 ♀, 15–17. VII. 1974 (H. KUROKO & M. OWADA), paratypes NSMT.

Distribution. Amur, Ussuri, Korea, Japan, China, Taiwan.

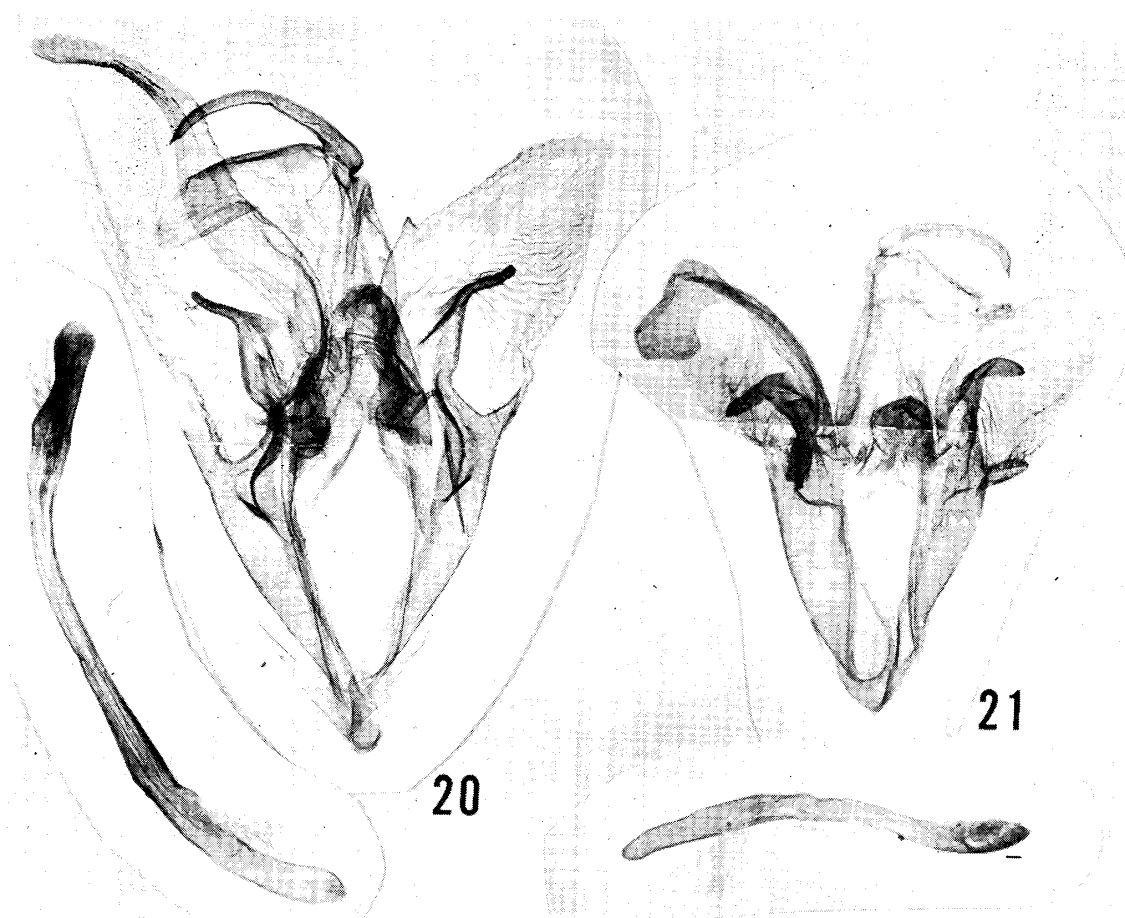
Catocala shirozui sp. n.

(Figs. 14, 15)

Apart from very characteristic hindwing pattern, the present new species is similar to both Himalayan *C. inconstans* BUTLER (Figs. 16, 17, 21) and Chinese *C. armandi* POUJADE. There is a long series of *inconstans* before me and the similarity in forewing is considerable between females.



Figs. 14–15. *Catocala shirozui* sp. n. 14: ♀, holotype, Lishan. 15: ♂, paratype, Nantou Hsien? Figs. 16–17. *Catocala inconstans* BUTLER. 16: ♀, Nepal, 17: ♂, Nepal. Fig. 18. *Catocala okurai* SUGI ♂, holotype. Fig. 19. *Catocala wushensis* OKANO ♂, 'Nantou Hsien'. Figures slightly reduced for natural size.



Figs. 20–21. Male genitalia. 20. *Catocala shirozui* sp. n.—21. *Catocala inconstans* BUTLER.

♀. Expanse 73 mm. Forewing somewhat shorter, with apex less acute and termen less oblique than in *inconstans*. Costa much whitish at bases of subbasal, antemedian and postmedian lines and of median whitish band. Antemedian line more angled inwards at median nervure and slightly more suffused with bluish white; reniform ringed with white, without blue-greyish shade posteriorly. The dark serrate shade just beyond subterminal line in *inconstans* reduced into series of subtriangular spots in cellules. A terminal series of pale points more reduced in size, each edged anteriorly by black lunar point, not bar-like as in *inconstans*. Hindwing bright orange yellow; median band nearly as in *inconstans*; marginal band extremely reduced in width, its outer edge being widely spaced off from termen at full span, most restricted at M_3 , both edges loosely defined and more or less divided by veins; terminal points at veins M_1 to CuA_2 , each edged posteriorly by fine dark point on cilia, the upper three being connected by a fine stria at their inner edge.

Underside. Creamy yellow, not so whitish as in *inconstans*. Marginal band of hindwing normal for the genus, clearly defined, and not reduced nor restricted as in upperside. Discoidal vein suffused with fuscous, not dotted as in *inconstans*.

♂. Expanse 71 mm. Much differing from the female in forewing, which is generally suffused with dark fuscous brown, finely irrorated with purplish white. Patterns less clear in median to subterminal spaces, ante- and postmedian lines thinner

and diffuse, subterminal line and dark serrate shade beyond it being hardly recognizable. Hindwing as in female.

Hindtibia not spined in both sexes.

Male genitalia (Fig. 20). Strongly asymmetrical. Uncus long, hook-like. Left valva longer, costa broadly sclerotized, heavily incurved at middle, bent ventrad towards apex, with toothed edge and ending into costal lobation. Right valva rather fully membranous, much shorter, tapered apically to a point and bearing a small angulation at costa before middle. Harpe moderate, similar in both sides of valva. Aedeagus moderately curved.

Holotype ♀. Nantou-Hsien: Lishan, 30. VII. 1970 (Y. MIYAKE), NSMT. Paratypes. Nantou Hsien: Wushe, 1 ♂, VI. 1969, ex H. KEZUKA, SS. Hualien Hsien: Mt. Hohuanshan, 3100 m, 1 ♂, 8. VIII. 1974 (Y. KISHIDA), YK.

Distribution. Taiwan.

Comment. In the male genitalia the present new species seems closer to *C. armandi* POUJADE from Szechwan and Yunnan (MELL, 1936: 76-77, figs. 18a, b). MELL's drawings¹⁾ of the both sides of valva are similar to some extent to those of the present new species, especially in the presence of small angulation on costa of right valva. Specimen of *armandi* is not known to me but, as commented by MELL (1938: 147), it should not be associated with *C. tapestrina* MOORE from India, of which I have examined a good Nepalese series (NSMT).

I am of great pleasure to name this beautiful species in honour of Prof. T. SHIRÔZU of Kyushu University, whose contributions to taxonomy of the Taiwanese butterflies are greatly esteemed.

Catocala okurai SUGI

(Fig. 18)

Catocala okurai SUGI, 1965, Tinea, 7: 84, pl. 16: 1, la; pl. 17: 8, 9.

This species is apparently the representation of *C. columbina* LEECH in Taiwan, separated by the prominent olivaceous hue on forewing and by the minor differences in the male genitalia as described (SUGI, 1965). *Columbina* is distributed in middle to western provinces of mainland China, ranging eastwards to the southwest of Japan. In Japan it is rather local, associated with shrub of *Spiraea blumei* G. DON growing chiefly on rocky slope (MASUI, 1982).

Okurai is one of the commonest *Catocala* of Taiwan. I have seen many specimens of both sexes from Wushe, Nantou Hsien, the type-locality. The following specimens coming from other localities bear exact collecting data.

Specimens examined. Taoyuan Hsien: Lalashan, 1. VII. 1969, ex. T. SHIMONOYA, SS. Nantou Hsien: Hotso [Lushan], 3 ♂ 1 ♀, 26-29. VI. 1973 (M. OWADA), NSMT;

1) In using for identification MELL's (1936) line-drawings of the removed valva of the male genitalia, one should be aware of that, in the majority of them, figures are shown in mirror image, or sketched through from dorsal side. In such cases what he regarded as 'linke' (left) or 'rechte' (right) valva are representing respectively that of the opposite side in usual sense and of the insect itself. For instance, his stating that, in *Catocala nupta* showing valvae strongly asymmetrical, the characters of each are reversed between European and Japanese races, is contrary to the fact.

1 ♂, 3 ♀, 15–17. VI. 1974 (H. KUROKO & M. OWADA), NSMT.

Distribution. Taiwan.

Catocala wushensis OKANO

(Fig. 19)

Catocala wushensis OKANO, 1964, Tohoku Konchu Kenkyu, 1: 42, fig. 2, pl. 4: 1.

A distinct species endemic to Taiwan. Forewing pattern shows much in common with *C. jonasii* BUTLER from Japan and Korea and the both come close to form a subgroup. In *wushensis*, the marginal band of hindwing is completely lost between veins M_3 and CuA_1 on upperside, a phenomenon similar to that seen in the hindwing of *C. shirozui* sp. n. described above. The male genitalia figured by OKANO (1964) are fairly distinct from those of *jonasii* I examined, mainly in the shape of right side harpe, which in *jonasii* is much dilated into disc with dentate apical margin, while in *wushensis* it is simply rod-like, slightly sinuous.

The food-plant of *jonasii* known in Japan is *Zelkova serrata* (THUNB.) MAKINO in the Ulmaceae (SATO & SEINO, 1971).

Wushensis was described on a single male from Wushe, Nantou Hsien. I have seen a few specimens in Dr. H. KEZUKA's collection, labeled 'Lantow Hsien', possibly a misspelling of Nantou Hsien. Illustrated specimen is of this source.

Specimen examined. 'Lantow Hsien', 1 ♂, VI. 1971, ex H. KEZUKA, YK.

Distribution. Taiwan.

Acknowledgement

In the present study I owed partly the personal collections of Messrs. T. HARUTA and Y. KISHIDA and Dr. H. KEZUKA, to all of whom I much appreciate. I also acknowledge Mr. M. OWADA for use of the National Science Museum collection, Tokyo.

摘 要

台湾産の *Catocala* 11 種を図説した。そのうちには2新種と2台湾未記録種を含む、それらの和名は次のとおりである。

Catocala nupta (LINNAEUS) エゾベニシタバ

Catocala nivea BUTLER シロシタバ

Catocala formosana OKANO タイワンキシタバ

Catocala pataloides MELL クロクモキシタバ (新称)

Catocala naganoi SUGI キリタチキシタバ (新称)

Catocala tokui SUGI ヤクシマヒメキシタバ

Catocala intacta taiwana SUGI ウスイロキシタバ

Catocala praegnax sakaii KISHIDA コガタキシタバ

Catocala shirozui SUGI カスミキシタバ (新称)

Catocala okurai SUGI タイワンナマリキシタバ

Catocala wushensis OKANO キレオビキシタバ (新称)

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